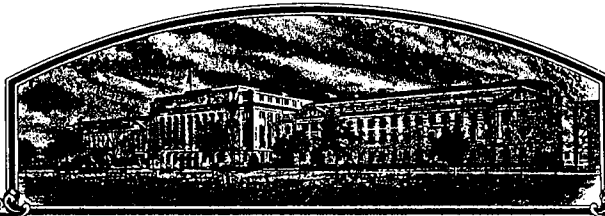


No.

8800003



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE
Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (AT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN

'PHV78'



Attest

Kenneth H. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

In Testimony Whereof, I have hereunto set
my hand and caused the seal of the Plant
Variety Protection Office to be affixed
at the City of Washington, D. C.
this 31st day of May in
the year of our Lord one thousand nine
hundred and eighty-eight.

Richard E. Lyng
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0681-0065

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

1. NAME OF APPLICANT(S) Pioneer Hi-Bred International, Inc.		2. TEMPORARY DESIGNATION		3. VARIETY NAME PHV78	
4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) Plant Breeding Division Department of Corn Breeding PO Box 85, Johnston, IA 50131-0085		5. PHONE (Include area code) 515/270-3300		FOR OFFICIAL USE ONLY PVPO NUMBER 8800003	
6. GENUS AND SPECIES NAME Zea mays		7. FAMILY NAME (Botanical) Gramineae		FILING DATE <u>October 1, 1987</u> TIME <u>1:30</u> <input type="checkbox"/> A.M. <input checked="" type="checkbox"/> P.M.	
8. KIND NAME Corn		9. DATE OF DETERMINATION 1985		AMOUNT FOR FILING \$ <u>1800.00</u> DATE <u>October 1, 1987</u> FEE RECEIVED AMOUNT FOR CERTIFICATE \$ <u>200.00</u> DATE <u>April 11, 1988</u>	
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) Corporation				12. DATE OF INCORPORATION May 6, 1926	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION Iowa					
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS Dr. Richard L. McConnell Pioneer Hi-Bred International, Inc. Plant Breeding Division PO Box 85, Johnston, IA 50131-0085 PHONE (Include area code): 515-270-3363					
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED					
a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.)					
b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement.					
c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety (Request form from Plant Variety Protection Office.)					
d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of Variety.					
e. <input checked="" type="checkbox"/> Exhibit E, Statement of the Basis of Applicant's Ownership.					
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act.) <input type="checkbox"/> Yes (If "Yes," answer items 16 and 17 below) <input checked="" type="checkbox"/> No					
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> Yes <input type="checkbox"/> No			17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input type="checkbox"/> Foundation <input type="checkbox"/> Registered <input type="checkbox"/> Certified		
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? <input type="checkbox"/> Yes (If "Yes," give date) <input checked="" type="checkbox"/> No					
19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES? <input type="checkbox"/> Yes (If "Yes," give names of countries and dates) <input checked="" type="checkbox"/> No					
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable. The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF APPLICANT Pioneer Hi-Bred International, Inc. by: <u>Richard L. McConnell</u>				DATE <u>9/25/87</u>	
SIGNATURE OF APPLICANT				DATE	

C O R N

PHV78

14A. Exhibit A. Origin and Breeding History

Pedigree: G42/595)X1112X

Pioneer line PHV78, Zea mays L., a yellow dent corn inbred, was developed by Pioneer Hi-Bred International, Inc. from the single cross G42 x 595 using the pedigree method of breeding. The progenitors of PHV78 are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Selfing and selection were practiced within the above F1 cross for six generations in the development of PHV78 at Shelbyville, Illinois. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Shelbyville, Illinois, and at other Pioneer research stations in the mid to late maturity areas of the U.S. Corn Belt. After initial testing additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations made for uniformity.

PHV78 has shown uniformity and stability for all traits as described in Exhibit C (form LPGS-470-28) - "Objective Description of Variety." It has been self-pollinated and ear-rowed a sufficient number of generations with careful attention paid to uniformity of plant type to assure genetic homozygosity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity.

No variant traits have been observed or are expected in PHV78.

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14B. Exhibit B. Novelty Statement

PHV78 is most similar to the Pioneer inbred line G35 (PVP Certificate #8300140). PHV78 is taller, higher eared, and later in maturity than G35.

	<u>GDU-Shed</u>	<u>GDU-Silk</u>	<u>Plant Height (in.)</u>	<u>Ear Height (in.)</u>
PHV78	1549	1617	92.6	35.4
PHG35	1541	1582	77.6	32.2
Reps	117	101	45	45
Diff.	8	34	15.0	3.2
Prob.	.227	.000#	.000#	.001#

Data are from three years (1985-87).

= 1%, + = 5%, * = 10% significance

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14B. Exhibit B. Novelty Statement (continued)

Electrophoresis Isozyme Profiles

- Alleles Present in Inbreds -

<u>Locus</u>	<u>R151</u>	<u>PHG35</u>	<u>PHV78</u>	<u>PHG42⁺</u>	<u>PH595⁺</u>
Acpl	2	4	2	2	4
Adh1	6	4	4	4	4
Cat3	9	9	9	9	9
Got1	4	4	4	4	4
Got2	4	4	4	4	4
Got3	4	4	4	4	4
Idh1	4	4	4	4	4
Idh2	4	6	6	6	4
Mdh1	6	6	1	1	6
Mdh2	3.5	6	3.5	3.5	6
Mdh3	16	16	16	16	16
Mdh4	12	12	12	12	12
Mdh5	12	12	12	12	12
Pgm1	9	9	9	9	9
Pgm2	4	3	3	4	3
Pgd1	3.8	3.8	3.8	3.8	3.8
Pgd2	5	5	5	5	5
Phil	5	4	4	4	4

⁺ = parents of PHV78

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, POULTRY, GRAIN & SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Corn)

OBJECTIVE DESCRIPTION OF VARIETY
CORN (ZEA MAYS)

NAME OF APPLICANT(S) Pioneer Hi-Bred International, Inc.	FOR OFFICIAL USE ONLY PVPO NUMBER 8800003
ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code) Plant Breeding Division Department of Corn Breeding PO Box 85 Johnston, IA 50131-0085	VARIETY NAME OR TEMPORARY DESIGNATION PHV78

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g., or) when number is either 99 or less or 9 or less.

1. TYPE:

1 = SWEET 2 = DENT 3 = FLINT 4 = FLOUR 5 = POP 6 = ORNAMENTAL

2. REGION WHERE BEST ADAPTED IN THE U.S.A.:

1 = NORTHWEST 2 = NORTHCENTRAL 3 = NORTHEAST 4 = SOUTHEAST
5 = SOUTHCENTRAL 6 = SOUTHWEST 7 = MOST REGIONS

3. MATURITY (In Region of Best Adaptability):

(Under "comments" (pg. 3) state how heat units were calculated)

<input type="text" value="7"/> <input type="text" value="6"/>	DAYS FROM EMERGENCE TO 50% OF PLANTS IN SILK	<input type="text" value="1"/> <input type="text" value="6"/> <input type="text" value="1"/> <input type="text" value="0"/>	HEAT UNITS
<input type="text" value=""/> <input type="text" value=""/>	DAYS FROM 50% SILK TO OPTIMUM EDIBLE QUALITY	<input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/>	HEAT UNITS
<input type="text" value=""/> <input type="text" value=""/>	DAYS FROM 50% SILK TO HARVEST AT 25% KERNEL MOISTURE	<input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/>	HEAT UNITS

4. PLANT:

CM. HEIGHT (To tassel tip) CM. EAR HEIGHT (To base of top ear)
 CM. LENGTH OF TOP EAR INTERNODE

Number of Tillers:

1 = NONE 2 = 1-2 3 = 2-3 4 = > 3

Number of Ears Per Stalk:

1 = SINGLE 2 = SLIGHT TWO-EAR TENDENCY
3 = STRONG TWO-EAR TENDENCY 4 = THREE-EAR TENDENCY

Cytoplasm Type:

1 = NORMAL 2 = "T" 3 = "S" 4 = "C" 5 = OTHER (Specify) _____

5. LEAF (Field Corn Inbred Examples Given):

Color:

1 = LIGHT GREEN (HY) 2 = MEDIUM GREEN (WF9) 3 = DARK GREEN (B14) 4 = VERY DARK GREEN (K166)

Angle from Stalk (Upper half):

1 = < 30° 2 = 30-60° 3 = > 60°

Sheath Pubescence:

1 = LIGHT (W22) 2 = MEDIUM (WF9)
3 = HEAVY (OH26)

Marginal Waves:

1 = NONE (HY) 2 = FEW (WF9) 3 = MANY (OH7L)

Longitudinal Creases:

1 = ABSENT (OH51) 2 = FEW (OH56A)
3 = MANY (PA11)

Width:

CM. WIDEST POINT OF EAR NODE LEAF

Length:

CM. EAR NODE LEAF

NUMBER OF LEAVES PER MATURE PLANT

6. TASSEL:

0 8

NUMBER OF LATERAL BRANCHES

Branch Angle from Central Spike:

2

1 = $< 30^\circ$ 2 = $30-40^\circ$ 3 = $> 45^\circ$

Penduncle Length:

2 2

CM. FROM TOP LEAF TO BASAL BRANCHES

Pollen Shed:

3

1 = LIGHT (WF9)

2 = MEDIUM

3 = HEAVY (KY21)

3

Anther Color:

1 = YELLOW

2 = PINK

3 = RED

4 = PURPLE

5 = GREEN

5

Glume Color:

6 = OTHER (Specify) _____

Pollen Restoration for Cytoplasm (0 = Not Tested, 1 = Partial, 2 = Good)

0

"T"

0

"S"

0

"C"

0

OTHER (Specify Cytoplasm and degrees of restoration) _____

7. EAR (Husked Ear Data Except When Stated Otherwise):

1 7

CM LENGTH

4 7

MM. MID-POINT
DIAMETER

1 2 0

GM. WEIGHT

Kernel Rows:

2

1 = INDISTINCT

2 = DISTINCT

1 6

NUMBER

1

1 = STRAIGHT

2 = SLIGHTLY CURVED

3 = SPIRAL

Silk Color (Exposed at Silking Stage):

4

Observed deep purplish red

1 = GREEN

2 = PINK

3 = SALMON

4 = RED

Husk Color:

2

FRESH

1 = LIGHT GREEN

2 = DARK GREEN

3 = PINK

6

DRY

4 = RED

5 = PURPLE

6 = BUFF

Observed very pale yellow

Husk Extension: (Harvest Stage)

3

1 = SHORT (Ears Exposed) 2 = MEDIUM (Barely Covering Ear)

3 = LONG (8-10CM Beyond Ear Tip)

4 = VERY LONG (> 10 CM)

Husk Leaf:

1

1 = SHORT (< 8 CM)

2 = MEDIUM (8-15 CM)

3 = LONG (> 15 CM)

Shank:

1 2

CM LONG

7

NO. OF INTERNODES

Position at Dry Husk Stage:

1

1 = UPRIGHT

2 = HORIZONTAL

3 = PENDENT

Taper:

2

1 = SLIGHT

2 = AVERAGE

3 = EXTREME

Drying Time (Unhusked Ear):

1

1 = SLOW

2 = AVERAGE

3 = FAST

8. KERNEL (Dried):

Size (From Ear Mid-Point):

1 0

MM LONG

0 9

MM. WIDE

0 4

MM. THICK

Shape Grade (% Rounds)

1

1 = < 20

2 = 20-40

3 = 40-60

4 = 60-80

5 = > 80

8. KERNEL (Dried) :

Pericarp Color: 1 = COLORLESS 2 = RED-WHITE CROWN 3 = TAN 4 = BRONZE
5 = BROWN 6 = LIGHT RED 7 = CHERRY RED
8 = VARIEGATED (Describe) _____

Aleurone Color: 1 = HOMOZYGOUS 2 = SEGREGATING (Describe) _____
Observed strong orange-yellow
 1 = WHITE 2 = PINK 3 = TAN 4 = BROWN 5 = BRONZE 6 = RED
7 = PURPLE 8 = PALE PURPLE 9 = VARIEGATED (Describe) _____

Observed strong orange-yellow
Endosperm Color: 1 = WHITE 2 = PALE YELLOW 3 = YELLOW 4 = PINK-ORANGE 5 = WHITE CAP.

Endosperm Type:

1 = SWEET (su1) 2 = EXTRA SWEET (sh2) 3 = NORMAL STARCH 4 = HIGH AMYLOSE STARCH
5 = WAXY STARCH 6 = HIGH PROTEIN 7 = HIGH LYSINE 8 = OTHER (Specify) _____

GM. WEIGHT /100 SEEDS (Unsize Sample)

9. COB:

MM. DIAMETER AT MID-POINT

Strength:

1 = WEAK 2 = STRONG

Color: Observed very dark grayish reddish brown

1 = WHITE 2 = PINK 3 = RED 4 = BROWN
5 = VARIEGATED 6 OTHER (Specify) _____

10. DISEASE RESISTANCE (0 = Not Tested, 1 = Susceptible, 2 = Resistant):

<input type="text" value="0"/> STALK ROT (Diplodia)	<input type="text" value="0"/> STALK ROT (Fusarium)	<input type="text" value="0"/> STALK ROT (Gibberella)
<input type="text" value="1"/> NORTHERN LEAF BLIGHT	<input type="text" value="1"/> SOUTHERN LEAF BLIGHT	<input type="text" value="1"/> SMUT (Common)
<input type="text" value="0"/> SOUTHERN RUST	<input type="text" value="2"/> CORN SMUT (Head)	<input type="text" value="0"/> BACTERIAL WILT (Stewart's)
<input type="text" value="0"/> BACTERIAL LEAF BLIGHT (Goss')	<input type="text" value="1"/> MAIZE DWARF MOSAIC	<input type="text" value="0"/> STUNT
<input type="text" value=""/> OTHER (Specify) _____		

11. INSECT RESISTANCE (0 = Not Tested, 1 = Susceptible, 2 = Resistant):

<input type="text" value="1"/> CORNBORER	<input type="text" value="0"/> EAWORM	<input type="text" value="0"/> SAPBEETLE	<input type="text" value="0"/> APHID
<input type="text" value="0"/> ROOTWORM (Northern)	<input type="text" value="1"/> ROOTWORM (Western)		
<input type="text" value="0"/> ROOTWORM (Southern)	<input type="text" value=""/> OTHER (Specify) _____		

12. VARIETIES MOST CLOSELY RESEMBLING THAT SUBMITTED FOR THE CHARACTERS GIVEN:

CHARACTER	VARIETY	CHARACTER	VARIETY
Maturity	G35	Kernel Type	595
Plant Type	G35	Quality (Edible)	
Ear Type	595	Usage	G35

REFERENCES:

U.S. Department Agriculture. Yearbook 1937.
Corn: Culture, Processing, Products. 1970 Avi Publishing Company, Westport, Connecticut. (Numerous Authors)
Emerson, R.A., G.W. Beadle, and A.C. Fraser. A Summary of Linkage Studies in Maize. Cornell A.E.S., Mem. 180. 1935.
The Mutants of Maize. 1968. Crop Science Society of America. Madison, Wisconsin.
Stringfield, G.H. Maize Inbred Lines of Ohio. Ohio A.E.S. Bul. 831. 1959.
Butler, D.R. 1954 - A System for the Classification of Corn Inbred Lines - PhD. Thesis, Ohio State University.

COMMENTS: Heat Units are accumulated from daily temperatures as follows:
HI = Maximum air temperature in Fahrenheit, but not greater than 86.
LO = Minimum air temperature in Fahrenheit, but not less than 50.
Heat Units = (HI + LO)/2 - 50, but not less than 0.

14D. Exhibit D.

Inbred per se comparison of PHV78 and G35 at the same locations. All values are expressed as percent of the test mean except yield, which is expressed as bushels/acre adjusted to 15.5% moisture, and GDU shed and silk, which are expressed in actual growing degree units.

	Inbred	Yield	Percent Yield	Moisture	GDU Shed	Stalk Lodging	Root Lodging	Barren Plants	Stay Green	Test Weight	Grain Quality	Cob Scores	Seedling Vigor	Plant Height	Ear Height	GDU Silk
No. of Reps.	37															
	PHV78	80	113	97	1580	101	94	114	110	97	101		95	115	114	1620
	G35	70	101	100	1550	92	102	102	99	100	102		95	93	101	1580
Diff.		10	12	3	30	9	8	12	11	3	1		0	12	13	40

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14D. Exhibit D.

Comparison of PHV78 and G35 crossed to the same tester line and the hybrids evaluated at the same locations. All values are expressed as percent of the test mean except yield, which is expressed as bushels/acre adjusted to 15.5% grain moisture (1986 data).

	Inbred	Yield	Percent Yield	Moisture	GDU Shed	Stalk Lodging	Root Lodging	Barren Plants	Stay Green	Test Weight	Grain Quality	Cob Scores	Seedling Vigor	Plant Height	Ear Height		
No. of Reps.		98	98	98	20	82	66	38	80	96	-	2	56	72	72		
	PHV78	158	107	102	101	98	95	100	102	98	-	103	100	103	103		
	G35	145	98	99	100	98	100	101	108	100	-	114	105	100	99		
Diff.		13	9	3	1	0	5	1	6	2	-	11	5	3	4		

14D. Exhibit D. Additional Description of PHV78

PHV78 is a yellow dent inbred line of corn, Zea mays L.

As an inbred per se, PHV78 is most similar to the Pioneer proprietary inbred lines G35 and 595. The similarities to 595 are expected because half of the parentage of PHV78 is 595. The other parent involved in the development of PHV78 is a proprietary Pioneer inbred line developed under drought stress at York, Nebraska.

For comparative purposes, data are attached with comparisons of PHV78 per se and in hybrid combinations with the Pioneer proprietary inbred line G35.

14E. Exhibit E. Statement of the Basis of Applicant's Ownership

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the development and evaluation of PHV78. Pioneer Hi-Bred International, Inc. has the sole rights and ownership of PHV78.